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DRINKING WATER SURVEILLANCE PROGRAM

**HALDIMAND/
NORFOLK
WATER SUPPLY
SYSTEM**

ANNUAL REPORT 1990



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WATER SUPPLY SYSTEM

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EXECUTIVE SUMMARY
DRINKING WATER SURVEILLANCE PROGRAM
HALDIMAND/NORFOLK WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Haldimand/Norfolk water supply system is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. This plant has a design capacity of $13.6 \times 1000 \text{ m}^3/\text{day}$. The Haldimand/Norfolk water supply system serves a population of approximately 5,200.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Haldimand/Norfolk water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '-' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW 1		RAW 2		TREATED		SITE 1		SITE 2	
	TESTS	POSITIVE	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS
BACTERIOLOGICAL	18	11	61	21	18	85	11	0	11	9	81	1
CHEMISTRY (FLO)	18	18	100	24	24	100	76	76	100	102	96	12
CHEMISTRY (LAB)	132	111	84	176	138	78	286	205	71	399	85	38
METALS	143	52	36	192	68	35	312	100	32	483	41	46
CHLOROBROMINATES	70	0	0	98	0	0	182	0	0	154	0	14
CHLOROPHENOLS	6	0	0	6	0	0	12	0	0	-	-	-
PAH	102	1	0	119	0	0	204	0	0	0	0	-
PESTICIDES & PCB	171	0	0	251	0	0	431	0	0	232	0	22
PHENOLICS	6	1	16	8	0	0	13	0	0	-	-	-
SPECIFIC PESTICIDES	29	0	0	33	0	0	63	0	0	11	0	1
VOLATILES	174	0	0	203	0	0	377	52	13	290	13	29
TOTAL	869	194		1131	248		433	216	691	316	63	221

DRINKING WATER SURVEILLANCE PROGRAM
HALDIMAND/NORFOLK WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Haldimand/Norfolk water supply system in the summer of 1989. A previous report was published for 1989.

PLANT DESCRIPTION

The Haldimand/Norfolk water supply system is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. This plant has a design capacity of $13.6 \times 1000 \text{ m}^3/\text{day}$. The Haldimand/Norfolk water supply system serves a population of approximately 5,200.

The sample day flows ranged from $3.3 \times 1000 \text{ m}^3/\text{day}$ to $5.1 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow

sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count, which may indicate some deterioration in water quality if the guideline of 500 counts/mL is exceeded.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 1 of 12 distributed water samples with a maximum reported value of 740.0 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 24 treated and distributed water samples with a maximum reported value of 22.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 25 of 25 treated and distributed water samples with a maximum reported value of 145.0 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 7 of 25 treated and distributed water samples with a maximum reported value of 190.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected in the treated or distributed water samples.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results were reported above trace levels.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in 23 of the 24 treated and distributed water samples analyzed. The maximum observed level was 61.4 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Haldimand/Norfolk water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1
HALDIMAND-NORFOLK WATER TREATMENT PLANT

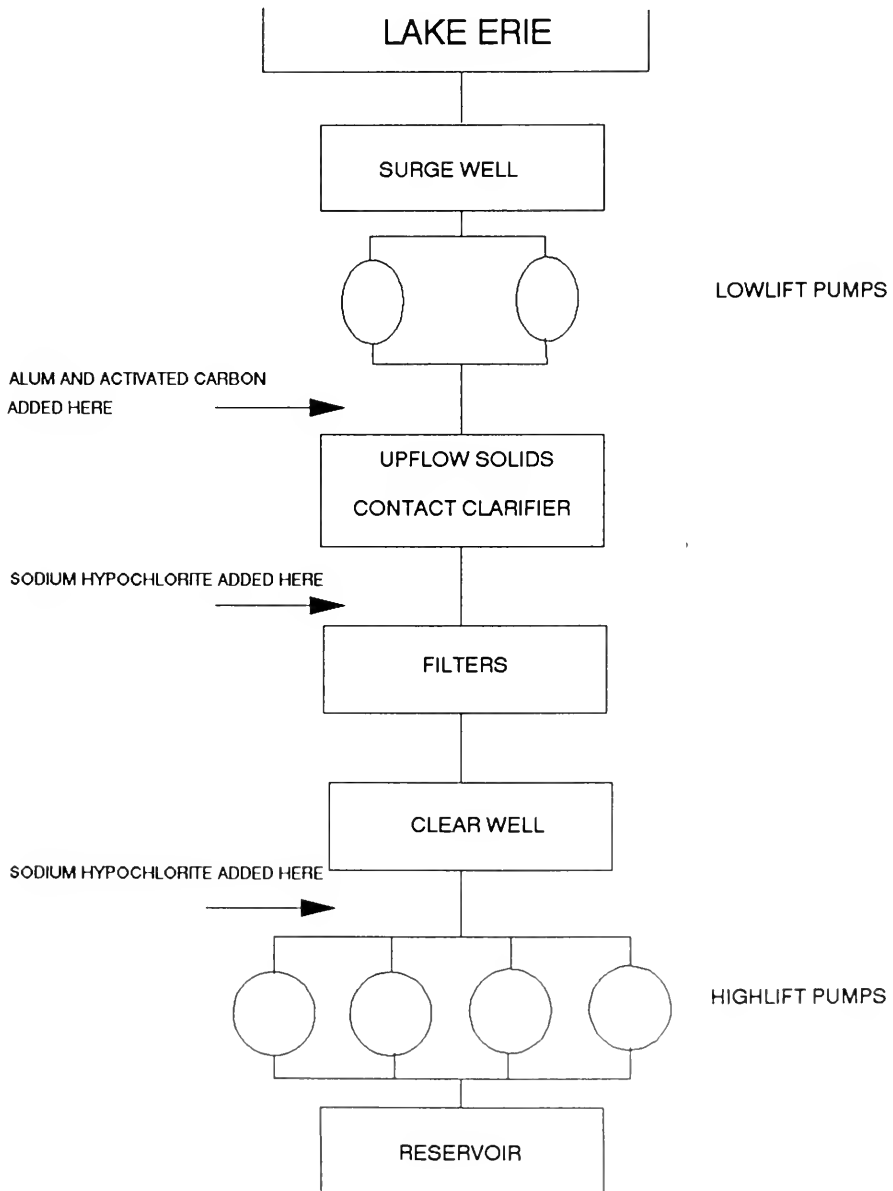


TABLE 1
 DRINKING WATER SURVEILLANCE PROGRAM
 PLANT GENERAL REPORT

WORKS #: 210001558
 PLANT NAME: HALDIMAND-NORFOLK WSS

DISTRICT: HALDIMAND-NORFOLK
 REGION: WEST CENTRAL
 DISTRICT OFFICER :J. VOGT

UTM #: 175734504737400

PLANT SUPERINTENDENT: GARY KEMPENAAR

ADDRESS: BOX 400
 NANTICOKE
 NOA 1LO
 (519-587-4565)

MUNICIPALITY: NANTICOKE
 AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	13.630	(X 1000 M3/DAY)
RATED CAPACITY:	4.250	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
HAGERSVILLE	2,298
JARVIS	1,270
TOWNSEND	639

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALUMINUM	AFTER DISINFECTION	DAILY
COMBINED CHLORINE RESIDUAL	HIGHLIFT DISCHARGE	VARIABLE
FREE CHLORINE RESIDUAL	HIGHLIFT DISCHARGE	CONTINUOUS
TOTAL CHLORINE RESIDUAL	HIGHLIFT DISCHARGE	VARIABLE
PH	AFTER DISINFECTION RAW WATER	DAILY DAILY
TEMPERATURE	RAW WATER	VARIABLE
TURBIDITY	AFTER DISINFECTION RAW WATER	CONTINUOUS CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)		
			PRE CHLORINATION	COAGULATION	POST CHLORINATION
			CHLORINE	ALUM LIQUID	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)			
JAN 10	.00	4.500	.89	14.70	.71
FEB 07	.00	3.870	.94	21.20	1.07
FEB 16	.00	.000		15.50	.94
FEB 27	1.57	4.800	.80	19.20	.65
MAR 07	1.50	5.100	.81	17.00	1.03
MAY 09	.00	3.800	.88	15.80	.82
JUN 05	48.00	3.300		12.30	.47
JUL 05	24.50	3.700	1.00	.07	1.10
AUG 08	8.00	4.500	3.01		1.29
SEP 05	.00	.000	2.13	12.60	1.47
NOV 08	.00	4.596	3.18	11.10	.32
DEC 03	24.00	3.500	3.30	15.20	.95

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW 1			RAW 2			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL															
FECAL COLIFORM MF	6	4	0	7	5	0	.	.	.	.	.	.	1	0	0
STANDRO PLATE CNT MF	.	.	.	.	.	.	11	0	0	11	9	0	.	.	.
TOTAL COLIFORM MF	6	1	0	7	6	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	6	6	0	7	7	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	18	11	0	21	18	0	11	0	0	11	9	0	1	0	0
CHEMISTRY (FLD)															
FLD CHLORINE (COMB)	.	.	.	.	.	.	12	12	0	21	18	0	2	1	0
FLD CHLORINE FREE	.	.	.	.	.	.	13	13	0	21	20	0	2	2	0
FLD CHLORINE (TOTAL)	.	.	.	.	.	.	13	13	0	21	21	0	2	2	0
FLD PH	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
FLD TEMPERATURE	6	6	0	8	8	0	12	12	0	21	21	0	2	2	0
FLD TURBIDITY	6	6	0	8	8	0	13	13	0	1	1	0	2	2	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	24	24	0	76	76	0	106	102	0	12	11	0
CHEMISTRY (LAB)															
ALKALINITY	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
CALCIUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
CYANIDE	6	0	0	8	0	0	13	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
COLOUR	6	2	4	8	2	6	13	1	8	21	0	11	2	0	2
CONDUCTIVITY	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
DISS ORG CARBON	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
FLUORIDE	6	6	0	8	8	0	13	12	1	21	21	0	2	2	0
HARONESS	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
IONCAL	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
LANGELIERS INDEX	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
MAGNESIUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
SODIUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
AMMONIUM TOTAL	6	4	1	8	0	2	13	0	0	21	1	5	2	1	1
NITRITE	6	4	2	8	1	7	13	1	4	21	8	9	2	0	2
TOTAL NITRATES	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
NITROGEN TOT KJELD	6	6	0	8	8	0	13	12	1	21	21	0	2	0	2
PH	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
PHOSPHORUS FIL REACT	6	0	4	8	2	4	13	0	3	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	5	1	8	5	3	13	0	9	.	.	.	.	.	.
SULPHATE	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
TURBIDITY	6	6	0	8	8	0	13	10	3	21	17	4	2	2	0
*TOTAL SCAN CHEMISTRY (LAB)	132	111	12	176	138	22	286	205	29	399	341	29	38	31	7

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS
SUMMARY TABLE OF RESULTS (1990)

SITE PARAMETER	RAW 1			RAW 2			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE

METALS															
SILVER	6	0	0	8	0	0	13	0	0	21	0	0	2	0	0
ALUMINUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
ARSENIC	6	0	6	8	1	7	13	0	9	21	0	21	2	0	0
BARIUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
BORON	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
BERYLLIUM	6	0	0	8	0	3	13	0	1	21	0	2	2	0	0
CADMIUM	6	0	1	8	0	0	13	0	2	21	0	1	2	0	0
COBALT	6	0	6	8	0	7	13	0	12	21	0	18	2	0	2
CHROMIUM	6	0	4	8	0	4	13	0	10	21	0	19	2	0	2
COPPER	6	1	5	8	0	8	13	0	13	21	21	0	2	1	1
IRON	6	1	5	8	5	3	13	0	1	21	0	7	2	1	0
MERCURY	5	0	1	8	0	1	13	0	3	.	.	.	.	.	.
MANGANESE	6	6	0	8	8	0	13	11	2	21	11	10	2	1	1
MOLYBDENUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
NICKEL	6	1	4	8	0	3	13	1	8	21	2	12	2	0	2
LEAD	6	1	4	8	0	8	13	0	7	21	13	8	2	1	1
ANTIMONY	6	5	1	8	2	6	13	7	6	21	18	3	2	2	0
SELENIUM	6	0	2	8	0	2	13	0	7	21	0	14	2	0	2
STRONTIUM	6	6	0	8	8	0	13	13	0	21	21	0	2	2	0
TITANIUM	6	1	5	8	4	4	13	4	9	21	6	15	2	0	2
THALLIUM	6	0	0	8	0	2	13	0	1	21	0	1	2	0	0
URANIUM	6	0	6	8	0	8	13	0	13	21	0	21	2	0	2
VANADIUM	6	1	5	8	1	7	13	11	2	21	5	16	2	0	2
ZINC	6	5	1	8	7	1	13	1	12	21	19	2	2	1	1
*TOTAL SCAN METALS															
*TOTAL GROUP INORGANIC & PHYSICAL	143	52	56	192	68	74	312	100	118	483	200	170	46	17	18
	293	181	68	392	230	96	674	381	147	988	643	199	96	59	25

CHLOROAROMATICS															
HEXACHLOROBUTADIENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
123 TRICHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
1234 T-CHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
1235 T-CHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
124 TRICHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
1245 T-CHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
135 TRICHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
HCB	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
HEXACHLOROETHANE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
OCTACHLOROSTYRENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
PENTACHLOROBENZENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
236 TRICHLOROTOLUENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
245 TRICHLOROTOLUENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
26A TRICHLOROTOLUENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0
*TOTAL SCAN CHLOROAROMATICS															
	70	0	0	98	0	0	182	0	0	154	0	0	14	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW 1			RAW 2			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS																		
234 TRICHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
2345 T-CHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
2356 T-CHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
245-TRICHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
246-TRICHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
PENTACHLOROPHENOL	1	0	0	1	0	0	2	0	0	-	-	-	-	-	-	-	-	-
*TOTAL SCAN CHLOROPHENOLS	6	0	0	6	0	0	12	0	0	0	0	0	0	0	0	0	0	0
PAH																		
PHENANTHRENE	6	1	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
ANTHRACENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
FLUORANTHENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
PYRENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(A)ANTHRACENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
CHRYSENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
DIMETH. BENZ(A)ANTHR	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(E) PYRENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(B) FLUORANTHEN	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
PERYLENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(K) FLUORANTHEN	6	0	1	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(A) PYRENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(G,H,I) PERYLENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
DIBENZO(A,H) ANTHRAC	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
INDENO(1,2,3-C,D) PY	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
BENZO(B) CHRYSENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
CORONENE	6	0	0	7	0	0	12	0	0	0	0	0	-	-	-	-	-	-
*TOTAL SCAN PAH	102	1	1	119	0	0	204	0	0	0	0	0	0	0	0	0	0	0
PESTICIDES & PCB																		
ALORIN	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
ALPHA BHC	5	0	3	7	0	2	13	0	8	11	0	7	1	0	0	0	0	0
BETA BHC	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
LINDANE	5	0	0	7	0	0	13	0	1	11	0	0	1	0	0	0	0	0
ALPHA CHLORDANE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
GAMMA CHLORDANE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
DIELDRIN	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
METHOXYCHLOR	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
ENDOSULFAN I	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
ENDOSULFAN II	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
ENDRIN	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
ENDOSULFAN SULPHATE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
HEPTACHLOR EPOXIDE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
HEPTACHLOR	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
MIREX	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
OXYCHLORDANE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
OPDDT	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
PCB	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
DDD	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
PPDDE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW 1			RAW 2			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
AMETRINE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
ATRAZINE	5	0	2	8	0	1	12	0	3	.	.	.	.	.	.	.	.	.
ATRATONE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
CYANAZINE (BLADEX)	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
DESETHYLATRAZINE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
PROMETONE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
PROPAZINE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
PROMETRYNE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
METRIBUZIN (SENCOR)	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
SIMAZINE	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
ALACHLOR (LASSO)	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
METOLACHLOR	5	0	0	8	0	0	12	0	0	.	.	.	.	.	.	.	.	.
HEXACHLOROCYCLOPENTADIEN	1	0	0	.	.	.	2	0	0	1	0	0	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	171	0	5	251	0	3	431	0	12	232	0	7	22	0	0	0	0	0

PHENOLICS																		
PHENOLICS	6	1	3	8	0	5	13	0	6	.	.	.	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	1	3	8	0	5	13	0	6	0	0	0	0	0	0	0	0	0

SPECIFIC PESTICIDES																		
TOXAPHENE	5	0	0	7	0	0	13	0	0	11	0	0	1	0	0	0	0	0
2,4,5-T	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4-D	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4-DB	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4 D PROPIONIC ACID	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DICAMBA	0	0	0	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
SILVEX	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DIAZINON	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DICHLOROVOS	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CHLORPYRIFOS	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
ETHION	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
MALATHION	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
MEVINPHOS	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
METHYL PARATHION	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
METHYLTRITHION	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PARATHION	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PHORATE	0	0	0	1	0	0	1	0	0	.	.	.	.	.	.	.	.	.
RELDAN	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
RONNEL	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
BUX	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
CARBOFURAN	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CICP	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DIALLATE	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW 1			RAW 2			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
IPC	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PROPOXUR	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CARBARYL	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
BUTYLATE	1	0	0	1	0	0	2	0	0	.	.	.	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	29	0	0	33	0	0	63	0	0	11	0	0	1	0	0	0	0	0
VOLATILES																		
BENZENE	6	0	0	7	0	1	13	0	5	10	0	2	1	0	0	0	0	0
TOLUENE	6	0	0	7	0	1	13	0	12	10	0	4	1	0	0	0	0	0
ETHYLBENZENE	6	0	2	7	0	1	13	0	9	10	0	7	1	0	1	0	1	0
P-XYLENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
M-XYLENE	6	0	0	7	0	0	13	0	2	10	0	3	1	0	0	0	0	0
O-XYLENE	6	0	0	7	0	0	13	0	5	10	0	5	1	0	0	0	0	0
STYRENE	6	0	4	7	0	0	13	0	3	10	0	7	1	0	0	1	0	1
1,1 DICHLOROETHYLENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
METHYLENE CHLORIDE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,1,2 DICHLOROETHYLENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,1 DICHLOROETHANE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
CHLOROFORM	6	0	3	7	0	0	13	13	0	10	10	0	1	1	0	1	0	0
111, TRICHLOROETHANE	6	0	0	7	0	0	13	0	1	10	0	0	1	0	0	0	0	0
1,2 DICHLOROETHANE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
CARBON TETRACHLORIDE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,2 DICHLOROPROPANE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
TRICHLOROETHYLENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
DICHLOROBROMOMETHANE	6	0	3	7	0	0	13	13	0	10	10	0	1	1	0	1	0	0
112 TRICHLOROETHANE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
CHLORODIBROMOMETHANE	6	0	1	7	0	0	13	13	0	10	9	0	1	1	0	1	0	0
T-CHLOROETHYLENE	6	0	0	7	0	0	13	0	1	10	0	0	1	0	0	0	0	0
BROMOFORM	6	0	0	7	0	0	13	0	13	10	0	10	1	0	1	0	1	0
1122 T-CHLOROETHANE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
CHLOROBENZENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,4 DICHLOROBENZENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,3 DICHLOROBENZENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
1,2 DICHLOROBENZENE	6	0	0	7	0	0	13	0	0	10	0	0	1	0	0	0	0	0
ETHYLENE DIBROMIDE	6	0	0	7	0	0	13	0	0	10	0	1	1	0	0	0	0	0
TOTL TRIHALOMETHANES	6	0	1	7	0	0	13	13	0	10	10	0	1	1	0	1	0	0
*TOTAL SCAN VOLATILES	174	0	14	203	0	3	377	52	51	290	39	39	29	4	3	0	0	0
*TOTAL GROUP ORGANIC	558	2	23	718	0	11	1282	52	69	687	39	46	66	4	3	0	0	0

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
ILL	No Data: Sample Incorrectly Labelled
IIS	No Data: Insufficient Sample
IIV	No Data: Inverted Septum
ILA	No Data: Laboratory Accident
ILD	No Data: Test Queued After Sample Discarded
INA	No Data: No Authorization To Perform Reanalysis
INP	No Data: No Procedure
INR	No Data: Sample Not Received
IOP	No Data: Obscured Plate
IQU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
IPN	No Data: Sample pH Outside Valid Range
IRE	No Data: Received Empty
IRO	No Data: See Attached Report (no numeric results)
ISM	No Data: Sample Missing
ISS	No Data: Send Separate Sample Properly Preserved
IUI	No Data: Indeterminant Interference
ITX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT

RAW 1		RAW 2	TREATED	STANDING	SITE 1	FREE FLOW	STANDING	SITE 2	FREE FLOW
DISTRIBUTION SYSTEM									
BACTERIOLOGICAL									
FECAL COLIFORM MF (CT/100ML)									
DET'N LIMIT = 0									
GUIDELINE = 0 (A1)									
JAN	2								
FEB	1								
MAR	1								
APR	2								
MAY	0								
JUN	2								
JUL	180								
AUG	2								
SEP	BOL								
OCT	2								
NOV	BOL								
DEC	4								
STANDARD PLATE CNT MF (COUNTS/ML)									
DET'N LIMIT = 0									
GUIDELINE = 500/ML (A3)									
JAN			1 <=>					51	
FEB			1 <=>					10	
MAR			0 <=>					37	
APR			4 <=>					18	
MAY			1 <=>					2 <=>	
JUN								2 <=>	
JUL			0 <=>					45	
AUG			1 <=>					11	
SEP			5 <=>					120	
OCT			1 <=>					59	
NOV			0 <=>					740	
DEC			0 <=>						0 <=>
TOTAL COLIFORM MF (CT/100ML)									
DET'N LIMIT = 0									
GUIDELINE = 5/100ML(A1)									
JAN	2300								
FEB	112								
MAR	36								
APR	10								
MAY									
JUN	80 <=>								
JUL	4000 <=>								
AUG	3000 <=>								
SEP	400 <=>								
OCT	100 <=>								
NOV	20 <=>								
DEC	130								

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
RAW 1	RAW 2	TREATED	SITE 1	SITE 2	
			STANDING	FREE FLOW	STANDING
			GUIDELINE = N/A		
T COLIFORM BCKGRD MF (CT/100ML)	DET'N LIMIT = 0				FREE FLOW
JAN	75000	.	.	.	.
FEB	2600	.	.	.	.
MAR	168	.	.	.	.
APR	230	.	.	.	.
MAY	1360	.	.	.	.
JUN	48000 >	.	.	.	.
JUL	00000	.	.	.	.
AUG	00000 >	.	.	.	.
SEP	6900	.	.	.	.
OCT	2040	.	.	.	.
NOV	660	.	.	.	.
DEC	2200	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDWMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT

RAW 1	RAW 2	TREATED	SITE 1				SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW		
CHEMISTRY (FLO)								
FLO CHLORINE (COMB) (MG/L)								
			DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	-		.150	.100		.100	-	
FEB	-		.100	.000		.100	-	
MAR	-		.170	.200		.100	-	
APR	-			.100		.200	-	
MAY	-		.080	.100		.100	-	
JUN	-		.050	.100		.100	-	
JUL	-		.050	.050		.100	-	
AUG	-		.300	.200		.100	-	
SEP	-		.200	.100		.000	-	
OCT	-		.050	.100		.000	-	
NOV	-		.160			.100	-	
DEC	-		.050				.050	
FLO CHLORINE FREE (MG/L)								
			DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	-		.750	.000		.300	-	
FEB	-		.900	.100		.200	-	
MAR	-		.750	.100		.300	-	
APR	-		.620	.100		.200	-	
MAY	-		.600	.100		.200	-	
JUN	-		.250	.100		.100	-	
JUL	-		.450	.050		.100	-	
AUG	-		.400	.100		.300	-	
SEP	-		1.000	.200		.300	-	
OCT	-		1.100	.050		.100	-	
NOV	-		.940				-	
DEC	-		.950			.100	.350	
FLO CHLORINE (TOTAL) (MG/L)								
			DET'N LIMIT = 0		GUIDELINE = N/A			
JAN	-		.900	.100		.400	-	
FEB	-		1.000	.100		.300	-	
MAR	-		.920	.300		.400	-	
APR	-		.620	.200		.500	-	
MAY	-		.680	.200		.300	-	
JUN	-		.300	.200		.300	-	
JUL	-		.500	.100		.200	-	
AUG	-		.700	.300		.400	-	
SEP	-		1.200	.300		.300	-	
OCT	-		1.150	.150		.100	-	
NOV	-		1.100			.200	-	
DEC	-		1.000				.400	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLO PH (CMNSLESS)						
		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)			
JAN	7.700	7.300	7.600	7.400		
FEB	7.900	7.700	7.600	7.600		
MAR	7.600	7.100	7.600	7.600		
APR	7.400	7.100	7.800	7.600		
MAY	7.500	6.900	7.400	7.400		
JUN	7.100	7.200	7.600	7.800		
JUL		7.000	7.600	7.600		
AUG	7.400	7.500	7.600	7.600		
SEP		7.000	7.600	7.600		
OCT	7.000	6.800	7.600	7.600		
NOV	7.300	6.700	7.600	7.600		
DEC	7.300	6.900		7.700	6.900	6.900
FLO TEMPERATURE (DEG.C)						
		DET'N LIMIT = N/A	GUIDELINE = 15 (A3)			
JAN	2.500	5.000	19.000	9.000		
FEB	4.000	7.000	19.000	9.000		
MAR	5.000	10.000	14.000	8.500		
APR	6.500	6.500	19.000	9.500		
MAY	9.500	11.000	21.000	11.000		
JUN	16.000	10.000	18.000	13.500		
JUL	19.500	19.500	22.000	16.500		
AUG	22.000	22.000	22.000	18.500		
SEP	23.000	21.000	23.000	19.000		
OCT	17.000	16.000	20.000	18.000		
NOV	11.000	13.000		15.000		
DEC	7.000	8.000			8.000	9.000
FLO TURBIDITY (FTU)						
		DET'N LIMIT = N/A	GUIDELINE = 1 (A1)			
JAN	3.000	.100				
FEB	5.900	.200				
MAR	1.400	.100				
APR	5.600	.090				
MAY	8.000	.080				
JUN	4.600	.080				
JUL	3.300	.060				
AUG	2.800	.070				
SEP	3.200	.080				
OCT	3.500	.080				
NOV	2.000	.080		.080	.080	.100
DEC	4.200	.130				

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALCALINITY (MG/L)						
DET'N LIMIT = 0.2						
GUIDELINE = 30-500 (A4)						
JAN	105.900	99.400	103.600	102.700		
FEB	101.900	97.500	102.700	100.800		
MAR	104.000	95.500	98.500	99.100		
APR	101.100	96.100	99.400	98.700		
MAY	98.500	92.300	98.400	97.800		
JUN	98.100	91.300	96.600	96.500		
JUL	99.100	91.300	96.900	95.800		
AUG	97.600	92.700	97.400	96.600		
SEP	94.800	90.100	96.600	96.000		
OCT	97.900	96.200		102.500		
NOV	101.100	97.400	103.200	100.400		
DEC	101.300	95.900			100.900	99.700
CALCIUM (MG/L)						
DET'N LIMIT = 0.2						
GUIDELINE = 100 (F2)						
JAN	40.200	41.000	42.400	42.200		
FEB	38.200	38.600	43.000	41.800		
MAR	40.900	39.800	40.160	40.810		
APR	38.000	38.800	40.800	40.400		
MAY	36.700	36.200	38.800	39.200		
JUN	35.500	36.800	39.200	39.200		
JUL	37.000	37.600	39.400	39.000		
AUG	37.300	35.400	39.000	38.800		
SEP	36.200	36.600	38.400	39.600		
OCT	36.400	37.800	40.600	40.200		
NOV	36.800	38.200			39.600	
DEC	37.900	37.400		40.800		39.700
CHLORIDE (MG/L)						
DET'N LIMIT = 0.2						
GUIDELINE = 250 (A3)						
JAN	15.900	17.800	17.300	17.200		
FEB	14.800	17.200	17.200	16.700		
MAR	15.200	14.500	13.100	16.700		
APR	14.900	16.000	16.400	16.100		
MAY		16.100	16.600	16.400		
JUN	14.700	16.400	16.800	16.700		
JUL	15.400	13.000	16.300	16.900		
AUG	15.900	17.600	18.300	17.700		
SEP	14.600	18.700	15.800	18.300		
OCT	14.300	18.200	18.000	17.800		
NOV	15.200	17.000		17.200		
DEC	15.000	17.400			17.600	17.200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

COLOUR (HZU)	RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)			
JAN	-	2,000	.500	.500 <T	.500 <T	.	.
FEB	-	1,500 <T	.500 <T	1,000 <T	.500 <T	.	.
MAR	-	1,000 <T	.500 <T	BDL	BDL	.	.
APR	-	1,500 <T	.500 <T	.500 <T	BDL	.	.
MAY	-	1,000 <T	BDL	BDL	BDL	.	.
JUN	-	1,000 <T	BDL	BDL	BDL	.	.
JUL	1,000 <T	.	BDL	BDL	BDL	.	.
AUG	2,500	.	.500 <T	.500 <T	BDL	.	.
SEP	.500 <T	.	.500 <T	.500 <T	.500 <T	.	.
OCT	2,000 <T	.	1,000 <T	1,000 <T	.500 <T	.	.
NOV	1,000 <T	.	BDL	.	.500 <T	.	.
DEC	4,500	.	1,000 <T	.	.	1,000 <T	1,000 <T
CONDUCTIVITY (UMHO/CM)							
			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)			
JAN	-	306	321	324	324	.	.
FEB	-	297	310	325	320	.	.
MAR	-	299	307	316	316	.	.
APR	-	295	309	318	316	.	.
MAY	-	289	296	311	309	.	.
JUN	-	285	296	308	308	.	.
JUL	289	.	298	307	306	.	.
AUG	292	.	301	312	311	.	.
SEP	281	.	298	308	307	.	.
OCT	289	.	320	331	329	.	.
NOV	296	.	311	.	317	.	.
DEC	298	.	311	.	.	315	317
DISS ORG CARBON (MG/L)							
			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)			
JAN	-	1,900	1,500	1,400	1,400	.	.
FEB	-	1,700	1,400	1,700	1,600	.	.
MAR	-	1,800	1,400	1,500	1,400	.	.
APR	-	2,000	1,700	1,700	1,500	.	.
MAY	-	2,000	1,700	1,700	1,700	.	.
JUN	-	1,400	2,000	1,700	1,700	.	.
JUL	2,300	.	1,500	1,500	1,400	.	.
AUG	2,300	.	1,700	1,500	1,600	.	.
SEP	1,900	.	1,600	1,600	1,600	.	.
OCT	2,100	.	1,600	1,600	1,600	.	.
NOV	2,100	.	1,600	1,500	1,500	.	.
DEC	1,900	.	1,600	.	1,700	1,500	1,600

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

FLUORIDE (MG/L)	RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)			
JAN	.120		.100	.100	.100		
FEB	.120		.100	.100	.100		
MAR	.120		.100	.100	.100		
APR	.120		.100	.100	.100		
MAY	.120		.100	.100	.100		
JUN	.120		.020 <T	.080	.080		
JUL	.120		.160	.120	.120		
AUG	.120		.100	.120	.120		
SEP	.100		.100	.100	.100		
OCT	.120		.120	.100	.100		
NOV	.140		.120	.100	.100		
DEC	.120		.100	.100	.100		.100
HARDNESS (MG/L)							
			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)			
JAN	139,000		141,000	144,000	145,000		
FEB	131,000		131,600	143,000	141,000		
MAR	137,600		134,100	136,000	137,000		
APR	130,000		132,000	137,000	136,000		
MAY	126,400		125,200	132,000	132,600		
JUN	123,400		127,000	132,000	132,000		
JUL	130,000		131,000	135,000	133,000		
AUG	130,300		125,600	132,900	133,800		
SEP	125,000		127,000	129,000	132,000		
OCT	127,000		132,000	138,000	138,000		
NOV	126,100		132,000		138,000		
DEC	131,700		129,400		138,000		135,700
TICAL (OMNSLESS)							
			DET'N LIMIT = N/A	GUIDELINE = N/A			
JAN	3.262		3.439	2.988	3.583		
FEB	1.076		4.513	1.673	1.673		
MAR	3.088		2.808	3.422	.090		
APR	.416		.675	.912	.663		
MAY	.388		1.263	1.962	1.126		
JUN	1.741		.714	1.467	.942		
JUL	.376		5.290	1.200	.153		
AUG	2.675		.371	.831	2.296		
SEP	1.310		1.301	.837	1.183		
OCT	.655		.887	.001	.886		
NOV	2.811		.184		2.618		
DEC	2.982		.034		.359		1.114

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

LANGLIERS INDEX (OMNSLESS)	RAW 1	RAW 2	TREATED	SITE 1				SITE 2			
				STANDING		FREE FLOW		STANDING		FREE FLOW	
				DET'N LIMIT = N/A		GUIDELINE = N/A		DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	.	.538	.457	.379	.379	.393	.393	.	.	.	.
FEB	.	.492	.193	.501	.461	.461	.461	.	.	.	.
MAR	.	.500	.300	.374	.414	.414	.414	.	.	.	.
APR	.	.507	.409	.495	.478	.478	.478	.	.	.	.
MAY	.	.473	.236	.309	.341	.341	.341	.	.	.	.
JUN	.	.419	.359	.446	.426	.426	.426	.	.	.	.
JUL	.470	.	.377	.490	.401	.401	.401	.	.	.	.
AUG	.395	.	.447	.507	.511	.511	.511	.	.	.	.
SEP	.404	.	.360	.467	.488	.488	.488	.	.	.	.
OCT	.437	.	.527	.608	.591	.591	.591	.	.	.	.
NOV	.473	.	.408	.	.459	.459	.459	.379	.	.	.
DEC	.416	.	.302	.	.	.	.	.384	.	.	.
MAGNESIUM (MG/L)											
JAN	.	9.300	9.400	9.400	9.500	9.500	9.500	.	.	.	.
FEB	.	8.600	8.550	8.800	8.900	8.900	8.900	.	.	.	.
MAR	.	8.600	8.400	8.750	8.550	8.550	8.550	.	.	.	.
APR	.	8.600	8.600	8.500	8.600	8.600	8.600	.	.	.	.
MAY	.	8.450	8.450	8.500	8.450	8.450	8.450	.	.	.	.
JUN	.	8.450	8.500	8.200	8.300	8.300	8.300	.	.	.	.
JUL	.	.	9.100	9.000	8.500	8.500	8.500	.	.	.	.
AUG	9.000	.	9.050	8.600	9.000	9.000	9.000	.	.	.	.
SEP	9.000	.	8.700	8.100	8.100	8.100	8.100	.	.	.	.
OCT	8.400	.	9.000	8.800	9.000	9.000	9.000	.	.	.	.
NOV	8.300	.	8.900	.	8.700	8.700	8.700	8.950	.	.	.
DEC	9.000	.	8.750	.	.	.	.	8.900	.	.	.
SODIUM (MG/L)											
JAN	.	10.200	11.800	11.200	11.200	11.200	11.200	.	.	.	.
FEB	.	8.000	10.100	10.200	10.000	10.000	10.000	.	.	.	.
MAR	.	9.200	10.300	9.900	10.000	10.000	10.000	.	.	.	.
APR	.	8.200	9.000	9.400	9.200	9.200	9.200	.	.	.	.
MAY	.	8.400	9.400	9.600	9.400	9.400	9.400	.	.	.	.
JUN	.	8.700	9.200	9.600	9.600	9.600	9.600	.	.	.	.
JUL	8.400	.	9.000	9.400	10.000	10.000	10.000	.	.	.	.
AUG	9.100	.	10.600	10.900	10.800	10.800	10.800	.	.	.	.
SEP	8.200	.	10.600	10.600	10.800	10.800	10.800	.	.	.	.
OCT	8.200	.	12.000	11.200	11.600	11.600	11.600	.	.	.	.
NOV	8.300	.	10.000	.	10.400	10.400	10.400	11.200	.	.	.
DEC	9.900	.	11.200	.	.	.	.	10.500	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MALDEN/NORFOLK USS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2		TREATED		SITE 1		SITE 2	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
AMMONIUM TOTAL (MG/L)		)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)			
JAN		BDL		BDL		BDL		.002 <T	
FEB		.002 <T		BDL		BDL		BDL	
MAR		BDL		BDL		BDL		BDL	
APR		.002 <T		BDL		.006 <T		.012	
MAY		BDL		BDL		BDL		BDL	
JUN				BDL		BDL		BDL	
JUL	.024			BDL		BDL		BDL	
AUG	.100			BDL		.006 <T		.002 <T	
SEP	BDL			BDL		.004 <T		BDL	
OCT	.018			BDL		BDL		BDL	
NOV	.002 <T			BDL				BDL	
DEC	.022			BDL				BDL	.014
NITRITE (MG/L)		)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)			
JAN		.004 <T		.002 <T		.003 <T		.002 <T	
FEB		.003 <T		BDL		.004 <T		.005	
MAR		.003 <T		BDL		.011		.006	
APR		.002 <T		.001 <T		.003 <T		.002 <T	
MAY		.005		.003 <T		.003 <T		.004 <T	
JUN		.004 <T		.005		.008		.007	
JUL	.010			BDL		.005		.009	
AUG	.006			BDL		.001 <T		BDL	
SEP	.055			.001 <T		.003 <T		.010	
OCT	.003 <T			BDL		BDL		BDL	
NOV	.003 <T			BDL				BDL	
DEC	.007			BDL					.004 <T
TOTAL NITRATES (MG/L)		)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)			
JAN		.280		.300		.220		.225	
FEB		.280		.290		.330		.335	
MAR		.280		.310		.365		.360	
APR		.210		.265		.270		.275	
MAY		.230		.320		.350		.345	
JUN		.210		.215		.240		.245	
JUL	.195			.200		.185		.205	
AUG	.280			.155		.190		.185	
SEP	.230			.180		.175		.170	
OCT	.190			.195		.165		.165	
NOV	.175			.215				.215	
DEC	.230			.245					.235
									.245

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

	RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)							
				DET'N LIMIT = 0.02			
				GUIDELINE = N/A			
JAN	.	.270	.170	.250	.160	.	.
FEB	.	.230	.110	.210	.170	.	.
MAR	.	.230	.150	.180	.170	.	.
APR	.	.220	.160	.210	.160	.	.
MAY	.	.210	.150	.160	.140	.	.
JUN	.	.240	.130	.140	.140	.	.
JUL	.440	.	.140	.170	.140	.	.
AUG	.550	.	.130	.140	.150	.	.
SEP	.250	.	.110	.150	.120	.	.
OCT	.250	.	.140	.130	.120	.	.
NOV	.550	.	.180	.	.150	.	.
DEC	.220	.	.090 <T	.	.	.090 <T	.090 <T
PH (DIMENSIONLESS)							
				DET'N LIMIT = N/A			
				GUIDELINE = 6.5-8.5(A4)			
JAN	.	8.350	8.290	8.180	8.200	.	.
FEB	.	8.340	8.060	8.300	8.280	.	.
MAR	.	8.310	8.160	8.220	8.250	.	.
APR	.	8.360	8.280	8.330	8.320	.	.
MAY	.	8.350	8.150	8.170	8.200	.	.
JUN	.	8.310	8.270	8.310	8.290	.	.
JUL	8.340	.	8.280	8.350	8.270	.	.
AUG	8.270	.	8.370	8.370	8.380	.	.
SEP	8.300	.	8.280	8.340	8.350	.	.
OCT	8.320	.	8.410	8.430	8.420	.	.
NOV	8.340	.	8.280	.	8.290	.	.
DEC	8.270	.	8.190	.	.	8.220	8.230
PHOSPHORUS FIL REACT (MG/L)							
				DET'N LIMIT = 0.0005			
				GUIDELINE = N/A			
JAN	.	.001 <T	BOL	.	.	.	.
FEB	.	.003	BOL	.	.	.	.
MAR	.	.001 <T	BOL	.	.	.	.
APR	.	BOL	BOL	.	.	.	.
MAY	.	BOL	BOL	.	.	.	.
JUN	.	.000 <T	BOL	.	.	.	.
JUL	BOL	.	BOL	.	.	.	.
AUG	BOL	.000 <T	.	.	.	.	.
SEP	.001 <T	.	BOL	.	.	.	.
OCT	.000 <T	.	.001 <T	.	.	.	.
NOV	.001 <T	.	.001 <T	.	.	.	.
DEC	.001 <T	.	BOL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDOLMAND/NORFOLK WSS 1990

WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			GUIDELINE = .40 (F2)			
JAN		.013				
FEB		.019				
MAR		.011				
APR		.009 <T				
MAY		.008 <T				
JUN		.008 <T				
JUL	.012	BDL				
AUG	.015	.003 <T				
SEP	.011	.002 <T				
OCT	.008 <T	.003 <T				
NOV	.074	.003 <T				
DEC	.019	.003 <T				
SULPHATE (MG/L)			GUIDELINE = 500 (A3)			
JAN		25.290	33.770	33.770		
FEB		24.880	33.710	33.070		
MAR		25.240	33.190	33.300		
APR		23.560	33.770	33.490		
MAY		24.240	30.000	31.300		
JUN		24.150	31.350	32.020		
JUL	24.600		31.590	32.100		
AUG	24.300		29.830	30.300		
SEP	23.670		29.880	30.120		
OCT	23.830		32.130	31.600		
NOV	23.910		30.010	29.480		
DEC	24.480		31.140	31.570		30.720
TURBIDITY (FTU)			GUIDELINE = 1 (A1)			
JAN		4.600	.190 <T	.150 <T		
FEB		7.000	.400	.430		
MAR		5.200	.590	.950		
APR		1.920	.220	.460		
MAY		1.870	.340	.340		
JUN		3.900	.210 <T	.320		
JUL	1.200		.370	.210 <T		
AUG	1.500		.270	.160 <T		
SEP	1.600		.330	.270		
OCT	2.300		.320	.270		
NOV	1.640		.170 <T	.250		
DEC	5.500		.310	.270	1.690	.460

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (UG/L)						
DET'N LIMIT = 0.10						
GUIDELINE = 100 (A4)						
JAN	40.000	38.000	44.000	32.000		
FEB	85.000	62.000	43.000	29.000		
MAR	42.000	45.000	38.000	37.000		
APR	23.000	51.000	50.000	40.000		
MAY	35.000	82.000	70.000	63.000		
JUN	57.000	66.000	61.000	61.000		
JUL	18.000	85.000	68.000	66.000		
AUG	19.000	190.000	170.000	160.000		
SEP	17.000	190.000	180.000	190.000		
OCT	31.000	120.000	130.000	140.000		
NOV	20.000	110.000		99.000		
DEC	69.000	71.000			59.000	42.000
ARSENIC (UG/L)						
DET'N LIMIT = 0.10						
GUIDELINE = 25 (A1)						
JAN	.780 <T	.230 <T	.210 <T	.230 <T		
FEB	.710 <T	.460 <T	.320 <T	.270 <T		
MAR	.700 <T	.170 <T	.240 <T	.340 <T		
APR	.800 <T	.270 <T	.210 <T	.240 <T		
MAY	.590 <T	.310 <T	.250 <T	.400 <T		
JUN	.610 <T	BDL	.230 <T	.120 <T		
JUL	.530 <T	BDL	.230 <T	.160 <T		
AUG	.680 <T	.300 <T	.260 <T	.240 <T		
SEP	.780 <T	.190 <T	.230 <T	.180 <T		
OCT	.820 <T	.370 <T	.490 <T	.400 <T		
NOV	.550 <T	BDL				
DEC	.640 <T	BDL		.130 <T		BDL
BARIUM (UG/L)						
DET'N LIMIT = 0.05						
GUIDELINE = 1000 (A2)						
JAN	24.000	22.000	27.000	24.000		
FEB	23.000	24.000	27.000	22.000		
MAR	22.000	21.000	21.000	21.000		
APR	23.000	22.000	26.000	21.000		
MAY	21.000	21.000	22.000	20.000		
JUN	21.000	19.000	20.000	20.000		
JUL		20.000	20.000	20.000		
AUG	20.000	21.000	22.000	21.000		
SEP	21.000	21.000	21.000	20.000		
OCT	25.000	24.000	21.000	21.000		
NOV	20.000	20.000	25.000	25.000		
DEC	23.000	21.000		20.000	21.000	21.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALOIMAND/NORFOLK USS 1990
WATER TREATMENT PLANT
DISTRIBUTION SYSTEM

RAW 1		RAW 2		TREATED		SITE 1		SITE 2	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
						STANDING		STANDING	
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TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT
DISTRIBUTION SYSTEM

RAW 1		RAW 2		TREATED		SITE 1		SITE 2	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
		</							

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	STANDING	SITE 1	FREE FLOW	STANDING	SITE 2	FREE FLOW
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)					
JAN	-	58,000 <T	6,100 <T	7,900 <T	9,100 <T	-	-	-	-
FEB	-	100,000	BDL	BDL	BDL	-	-	-	-
MAR	-	61,000	BDL	6,700 <T	BDL	-	-	-	-
APR	-	31,000 <T	BDL	BDL	BDL	-	-	-	-
MAY	-	38,000 <T	BDL	BDL	7,200 <T	-	-	-	-
JUN	-	61,000	BDL	BDL	BDL	-	-	-	-
JUL	-	31,000 <T	BDL	BDL	10,000 <T	-	-	-	-
AUG	-	30,000 <T	BDL	BDL	15,000 <T	-	-	-	-
SEP	-	27,000 <T	BDL	BDL	BDL	-	-	-	-
OCT	-	60,000 <T	BDL	BDL	BDL	-	-	-	-
NOV	-	9,600 <T	BDL	-	6,200 <T	-	-	-	-
DEC	-	120,000	BDL	-	-	-	70,000	-	BDL
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)					
JAN	-	.020 <T	.030 <T	-	-	-	-	-	-
FEB	-	BDL	BDL	-	-	-	-	-	-
MAR	-	BDL	BDL	-	-	-	-	-	-
APR	-	BDL	BDL	-	-	-	-	-	-
MAY	-	BDL	BDL	-	-	-	-	-	-
JUN	-	BDL	BDL	-	-	-	-	-	-
JUL	-	BDL	BDL	-	-	-	-	-	-
AUG	-	BDL	BDL	-	-	-	-	-	-
SEP	-	BDL	BDL	-	-	-	-	-	-
OCT	-	BDL	BDL	-	-	-	-	-	-
NOV	-	.050 <T	.100 <T	-	-	-	-	-	-
DEC	-	BDL	BDL	-	-	-	-	-	-
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)					
JAN	-	4,400	2,700	1,100	.670	-	-	-	-
FEB	-	5,600	1,200	1,300	.780	-	-	-	-
MAR	-	3,900	1,800	.750	.570	-	-	-	-
APR	-	2,700	1,800	.550	.480 <T	-	-	-	-
MAY	-	3,100	1,600	.870	.560	-	-	-	-
JUN	-	5,100	1,000	.500 <T	.380 <T	-	-	-	-
JUL	-	-	.810	.590	.440 <T	-	-	-	-
AUG	-	4,200	.730	.300 <T	.190 <T	-	-	-	-
SEP	-	3,800	.720	.490 <T	.620 <T	-	-	-	-
OCT	-	4,800	.270 <T	.470 <T	.460 <T	-	-	-	-
NOV	-	2,000	.260 <T	-	.940	-	-	-	-
DEC	-	6,500	.970	-	-	-	1,700	-	.110 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALOIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

		RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
					STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)					GUIDELINE = N/A			
				DET'N LIMIT = 0.05				
JAN		1.200	1.300		1.400	1.500		
FEB		1.200	1.300		1.500	1.400		
MAR		.930	1.200		1.600	1.300		
APR		1.500	1.500		1.300	1.500		
MAY		1.400	1.300		1.300	1.100		
JUN		.920	1.200		1.200	1.300		
JUL			1.100		1.200	1.200		
AUG			1.300		1.500	1.300		
SEP			1.300		1.400	1.300		
OCT			1.400		1.400	1.400		
NOV			1.200		1.400	1.200		
DEC		1.800	1.600				.920	1.400
NICKEL (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 350 (03)			
JAN			BOL	BOL	BOL	BOL		
FEB			BOL	BOL	.400 <T	BOL		
MAR			.900 <T	.720 <T	BOL	BOL		
APR			BOL	.640 <T	1.300 <T	1.500 <T		
MAY			.700 <T	.980 <T	.950 <T	1.200 <T		
JUN			.730 <T	.420 <T	.690 <T	.520 <T		
JUL				1.300 <T	1.300 <T	1.200 <T		
AUG		1.600 <T		.990 <T	1.200 <T	1.000 <T		
SEP		1.400 <T		.320 <T	BOL	BOL		
OCT		.370 <T		2.400	2.300	2.100 <T		
NOV		2.700		BOL		.390 <T		
DEC		.840 <T		.890 <T			1.500 <T	.820 <T
LEAD (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)			
JAN			.150 <T	BOL	5.800	.190 <T		
FEB			.250 <T	.160 <T	.730	.130 <T		
MAR			.100 <T	.520	.180 <T	.200 <T		
APR			.060 <T	BOL	.860	.780		
MAY			.130 <T	.100 <T	4.800	.880		
JUN			.130 <T	BOL	3.200			
JUL				.060 <T	4.000	1.100		
AUG		.490 <T		.120 <T	.770	.420 <T		
SEP		3.200		.070 <T	8.300	1.100		
OCT		.210 <T		.060 <T	.440 <T	.340 <T		
NOV		.160 <T		BOL		.190 <T		
DEC		.210 <T		BOL			2.800	.090 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990

WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
ANTHONY (UG/L)		GUIDELINE = 146 (04)					
		DET'M LIMIT = 0.05					
JAN	-	1.000	.330 <T	.590	.430 <T	-	-
FEB	-	.480 <T	.980	.650	.680	-	-
MAR	-	.420 <T	.480 <T	.600	.520	-	-
APR	-	.450 <T	.510	.550	.640	-	-
MAY	-	.500 <T	.390 <T	.620	.420 <T	-	-
JUN	-	.380 <T	.450 <T	.510	.520	-	-
JUL	.700	-	.570	.700	.720	-	-
AUG	.630	-	.610	.730	.600	-	-
SEP	.540	-	.520	.560	.490 <T	-	-
OCT	.480 <T	-	.380 <T	.580	.550	-	-
NOV	.570	-	.500 <T	-	.530	-	-
DEC	.530	-	.560	-	-	.670	.560
SELENIUM (UG/L)		GUIDELINE = 10 (A1)					
		DET'M LIMIT = 1.00					
JAN	-	BDL	1.700 <T	BDL	1.500 <T	-	-
FEB	-	BDL	BDL	BDL	BDL	-	-
MAR	-	1.100 <T	BDL	2.100 <T	BDL	-	-
APR	-	BDL	BDL	BDL	1.900 <T	-	-
MAY	-	BDL	1.300 <T	1.500 <T	1.500 <T	-	-
JUN	-	BDL	BDL	2.600 <T	1.800 <T	-	-
JUL	BDL	-	1.700 <T	2.000 <T	1.800 <T	-	-
AUG	1.300 <T	-	1.800 <T	2.200 <T	1.500 <T	-	-
SEP	BDL	-	1.100 <T	1.900 <T	1.600 <T	-	-
OCT	BDL	-	BDL	BDL	BDL	-	-
NOV	BDL	-	1.100 <T	-	1.700 <T	-	-
DEC	1.200 <T	-	1.100 <T	-	-	1.300 <T	1.300 <T
STROMTUM (UG/L)		GUIDELINE = N/A					
		DET'M LIMIT = 0.10					
JAN	-	190.000	200.000	200.000	200.000	-	-
FEB	-	190.000	420.000	200.000	190.000	-	-
MAR	-	180.000	200.000	250.000	250.000	-	-
APR	-	200.000	200.000	200.000	200.000	-	-
MAY	-	180.000	180.000	190.000	190.000	-	-
JUN	-	170.000	160.000	160.000	160.000	-	-
JUL	160.000	-	160.000	170.000	170.000	-	-
AUG	160.000	-	160.000	170.000	170.000	-	-
SEP	160.000	-	170.000	180.000	180.000	-	-
OCT	210.000	-	200.000	200.000	200.000	-	-
NOV	170.000	-	200.000	200.000	200.000	-	-
DEC	180.000	-	210.000	-	170.000	-	-
				190.000	190.000	190.000	190.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

	RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)							
			DET'M LIMIT = 0.50	GUIDELINE = N/A			
JAN	.	4,700 <T	3,200 <T	3,800 <T	3,700 <T	.	.
FEB	.	4,700 <T	11,000	8,700	8,800	.	.
MAR	.	4,500 <T	3,100 <T	4,400 <T	4,300 <T	.	.
APR	.	4,200 <T	2,900 <T	3,300 <T	2,900 <T	.	.
MAY	.	8,200	6,700	7,500	7,000	.	.
JUN	.	7,500	5,700	6,500	6,500	.	.
JUL	3,800 <T	.	3,200 <T	3,900 <T	4,000 <T	.	.
AUG	3,200 <T	.	2,700 <T	2,500 <T	2,500 <T	.	.
SEP	3,200 <T	.	2,500 <T	3,100 <T	2,800 <T	.	.
OCT	2,900 <T	.	1,700 <T	1,700 <T	1,700 <T	.	.
NOV	2,900 <T	.	2,000 <T	.	2,100 <T	.	.
DEC	5,500	.	2,400 <T	.	.	2,700 <T	2,500 <T
THALLIUM (UG/L)							
			DET'M LIMIT = 0.05	GUIDELINE = 13 (04)			
JAN	.	.060 <T	BDL	.060 <T	BDL	.	.
FEB	.	BDL	.100 <T	BDL	BDL	.	.
MAR	.	BDL	BDL	BDL	BDL	.	.
APR	.	BDL	BDL	BDL	BDL	.	.
MAY	.	BDL	BDL	BDL	BDL	.	.
JUN	.	BDL	BDL	BDL	BDL	.	.
JUL	BDL	.	BDL	BDL	BDL	.	.
AUG	BDL	.	BDL	BDL	BDL	.	.
SEP	BDL	.	BDL	BDL	BDL	.	.
OCT	BDL	.	BDL	BDL	BDL	.	.
NOV	BDL	.	BDL	BDL	BDL	.	.
DEC	BDL	.	BDL	.	BDL	BDL	BDL
URANIUM (UG/L)							
			DET'M LIMIT = 0.05	GUIDELINE = 100 (A1)			
JAN	.	.300 <T	.170 <T	.100 <T	.150 <T	.	.
FEB	.	.290 <T	.130 <T	.180 <T	.210 <T	.	.
MAR	.	.290 <T	.200 <T	.180 <T	.140 <T	.	.
APR	.	.280 <T	.160 <T	.140 <T	.190 <T	.	.
MAY	.	.330 <T	.210 <T	.150 <T	.150 <T	.	.
JUN	.	.380 <T	.150 <T	.160 <T	.150 <T	.	.
JUL	.310 <T	.	.100 <T	.130 <T	.110 <T	.	.
AUG	.330 <T	.	.230 <T	.170 <T	.160 <T	.	.
SEP	.330 <T	.	.120 <T	.080 <T	.150 <T	.	.
OCT	.410 <T	.	.200 <T	.210 <T	.200 <T	.	.
NOV	.320 <T	.	.260 <T	.	.190 <T	.	.
DEC	.340 <T	.	.220 <T	.	.	.160 <T	.250 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A			
JAN	-	.290 <T	.350 <T	.370 <T	.240 <T	-	.240 <T
FEB	-	.390 <T	.540	.400 <T	.310 <T	-	.310 <T
MAR	-	.320 <T	.560	.330 <T	.400 <T	-	.400 <T
APR	-	.390 <T	.650	.420 <T	.340 <T	-	.340 <T
MAY	-	.220 <T	.570	.420 <T	.330 <T	-	.330 <T
JUN	-	.240 <T	.630	.330 <T	.270 <T	-	.270 <T
JUL	.240 <T	-	.710	.460 <T	.500 <T	-	.500 <T
AUG	.220 <T	-	.590	.560	.510	-	.510
SEP	.360 <T	-	.640	.500 <T	.580	-	.580
OCT	.330 <T	-	.880	.680	.650	-	.650
NOV	.280 <T	-	.630	-	.460 <T	.350 <T	.430 <T
DEC	.640	-	.490 <T	-	-	-	-
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)			
JAN	-	2,300	1,500 <T	27,000	2,600	-	-
FEB	-	2,800	1,500 <T	7,600	2,500	-	-
MAR	-	2,700	1,700 <T	6,100	2,500	-	-
APR	-	2,500	1,700 <T	6,400	2,800	-	-
MAY	-	1,700 <T	1,400 <T	29,000	3,800	-	-
JUN	-	2,400	1,800 <T	20,000	3,400	-	-
JUL	7,300	-	1,900 <T	20,000	5,400	-	-
AUG	7,800	-	1,200 <T	2,900	1,700 <T	-	-
SEP	1,900 <T	-	1,500 <T	19,000	3,500	-	-
OCT	2,100	-	1,200 <T	2,300	1,600 <T	-	-
NOV	2,300	-	2,000 <T	-	2,400	-	-
DEC	4,300	-	2,500	-	-	39,000	1,700 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2		TREATED		SITE 1		SITE 2	
						STANDING		STANDING	
						FREE FLOW		FREE FLOW	
PAH						GUIDELINE = N/A			
PHENANTHRENE (NG/L)									
JAN	*	BDL	BDL	BDL	*	*	*	*	*
FEB	*	LOU	BDL	BDL	*	*	*	*	*
MAR	*	BDL	BDL	BDL	*	*	*	*	*
APR	*	BDL	BDL	BDL	*	*	*	*	*
MAY	*	BDL	BDL	BDL	ITS	*	*	*	*
JUN	*	BDL	BDL	BDL	*	*	*	*	*
JUL	BDL	*	BDL	BDL	*	*	*	*	*
AUG	230.000	*	BDL	BDL	*	1LA	*	*	*
SEP	BDL	*	BDL	BDL	*	*	*	*	*
OCT	BDL	*	BDL	BDL	*	*	*	*	*
NOV	BDL	*	BDL	BDL	*	*	*	*	*
DEC	BDL	*	BDL	BDL	*	*	*	*	*
BENZO(K) FLUORANTHENE (NG/L)						GUIDELINE = N/A			
JAN	*	BDL	BDL	BDL	*	*	*	*	*
FEB	*	LOU	BDL	BDL	*	*	*	*	*
MAR	*	BDL	BDL	BDL	*	*	*	*	*
APR	*	BDL	BDL	BDL	*	*	*	*	*
MAY	*	BDL	BDL	BDL	ITS	*	*	*	*
JUN	*	BDL	BDL	BDL	*	*	*	*	*
JUL	BDL	*	BDL	BDL	*	*	*	*	*
AUG	2.000 <T	*	BDL	BDL	*	1LA	*	*	*
SEP	BDL	*	BDL	BDL	*	*	*	*	*
OCT	BDL	*	BDL	BDL	*	*	*	*	*
NOV	BDL	*	BDL	BDL	*	*	*	*	*
DEC	BDL	*	BDL	BDL	*	*	*	*	*

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990

WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	STANDING	SITE 1	FREE FLOW	STANDING	SITE 2	FREE FLOW
PESTICIDES & PCB									
ALPHA BHC (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 700 (G)					
JAN	-	BOL	1,000 <T	-	-	BOL	-	-	-
FEB	-	1QU	BOL	-	-	BOL	-	-	-
MAR	-	1,000 <T	1,000 <T	-	-	1,000 <T	-	-	-
APR	-	1,000 <T	1,000 <T	-	-	2,000 <T	-	-	-
MAY	-	BOL	1,000 <T	-	-	1,000 <T	-	-	-
JUN	-	BOL	2,000 <T	-	-	2,000 <T	-	-	-
JUL	-	-	1,000 <T	-	-	BOL	-	-	-
AUG	1,000 <T	-	1,000 <T	-	-	2,000 <T	-	-	-
SEP	2,000 <T	-	1,000 <T	-	-	1,000 <T	-	-	-
OCT	BOL	-	2,000 <T	-	-	1,000 <T	-	-	-
NOV	1,000 <T	-	BOL	-	-	BOL	-	-	-
DEC	BOL	-	BOL	-	-	1,000 <T	-	-	-
ISM	-	-	BOL	-	-	-	-	-	BOL
LINDANE (NG/L)									
		DET'N LIMIT = 1,000		GUIDELINE = 4000 (A1)					
JAN	-	BOL	1,000 <T	-	-	BOL	-	-	-
FEB	-	1QU	BOL	-	-	BOL	-	-	-
MAR	-	BOL	BOL	-	-	BOL	-	-	-
APR	-	BOL	BOL	-	-	BOL	-	-	-
MAY	-	BOL	BOL	-	-	BOL	-	-	-
JUN	-	BOL	BOL	-	-	BOL	-	-	-
JUL	-	BOL	BOL	-	-	BOL	-	-	-
AUG	-	-	BOL	-	-	BOL	-	-	-
SEP	-	-	BOL	-	-	BOL	-	-	-
OCT	-	-	BOL	-	-	BOL	-	-	-
NOV	-	-	BOL	-	-	BOL	-	-	-
DEC	-	-	BOL	-	-	BOL	-	-	BOL
ISM	-	-	BOL	-	-	-	-	-	-
ATRAZINE (NG/L)									
		DET'N LIMIT = 50		GUIDELINE = 60000 (A2)					
JAN	-	BOL	BOL	-	-	-	-	-	-
FEB	-	BOL	1MR	-	-	-	-	-	-
MAR	-	BOL	BOL	-	-	-	-	-	-
APR	-	60,000 <T	BOL	-	-	-	-	-	-
MAY	-	BOL	90,000 <T	-	-	-	-	-	-
JUN	-	BOL	BOL	-	-	-	-	-	-
JUL	-	BOL	60,000 <T	-	-	-	-	-	-
AUG	90,000 <T	-	BOL	-	-	-	-	-	-
SEP	80,000 <T	-	BOL	-	-	-	-	-	-
OCT	BOL	-	BOL	-	-	-	-	-	-
NOV	115	-	150,000 <T	-	-	-	-	-	-
DEC	BOL	-	BOL	-	-	-	-	-	-

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

PHENOLICS (UG/L)	RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
	DET'N LIMIT = .2 GUIDELINE = 2 (A4)						
JAN	.	.600 <T	.400 <T	.	.	.	.
FEB	.	BDL	BDL	.	.	.	.
MAR	.	.600 <T	.800 <T	.	.	.	.
APR	.	.600 <T	.800 <T	.	.	.	.
MAY	.	BDL	BDL	.	.	.	.
JUN	.	.600 <T	BDL	.	.	.	.
JUL	1.800	.	BDL	.	.	.	.
AUG	.400 <T	.	.600 <T	.	.	.	.
SEP	BDL	.	BDL	.	.	.	.
OCT	.400 <T	.	BDL	.	.	.	.
NOV	BDL	.	BDL	.	.	.	.
DEC	1.000 <T	.	.600 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM WALDAMAND/NORFOLK WSS 1990

WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES							
BENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	*	BOL	BOL	*	BOL	*	BOL
FEB	*	BOL	BOL	*	BOL	*	BOL
MAR	*	.050 <T	.100 <T	*	BOL	*	BOL
APR	*	BOL	.150 <T	*	.100 <T	*	.100 <T
MAY	*	.11V	.150 <T	*	.100 <T	*	.100 <T
JUN	*	BOL	.100 <T	*	.11A	*	.11A
JUL	*	BOL	BOL	*	BOL	*	BOL
AUG	BOL	*	BOL	*	BOL	*	BOL
SEP	BOL	*	BOL	*	BOL	*	BOL
OCT	BOL	*	.050 <T	*	BOL	*	BOL
NOV	BOL	*	BOL	*	BOL	*	BOL
DEC	BOL	*	BOL	*	*	*	BOL

TOLUENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)			
JAN	*	.100 <T	.150 <T	*	.050 <T	*	.050 <T
FEB	*	BOL	BOL	*	BOL	*	BOL
MAR	*	BOL	.100 <T	*	BOL	*	BOL
APR	*	BOL	.100 <T	*	.050 <T	*	.050 <T
MAY	*	.11V	.150 <T	*	BOL	*	BOL
JUN	*	BOL	.100 <T	*	.11A	*	.11A
JUL	*	BOL	.100 <T	*	BOL	*	BOL
AUG	BOL	*	.100 <T	*	BOL	*	BOL
SEP	BOL	*	.050 <T	*	.050 <T	*	.050 <T
OCT	BOL	*	.100 <T	*	BOL	*	BOL
NOV	BOL	*	.050 <T	*	.050 <T	*	.050 <T
DEC	BOL	*	.100 <T	*	*	*	BOL

ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)			
JAN	*	BOL	BOL	*	BOL	*	BOL
FEB	*	BOL	BOL	*	BOL	*	BOL
MAR	*	.050 <T	.050 <T	*	.050 <T	*	.050 <T
APR	*	BOL	.200 <T	*	.250 <T	*	.250 <T
MAY	*	.11V	.100 <T	*	.100 <T	*	.100 <T
JUN	*	BOL	.050 <T	*	.11A	*	.11A
JUL	BOL	*	.100 <T	*	.150 <T	*	.150 <T
AUG	.050 <T	*	.150 <T	*	.100 <T	*	.100 <T
SEP	BOL	*	.150 <T	*	.050 <T	*	.050 <T
OCT	BOL	*	BOL	*	BOL	*	BOL
NOV	BOL	*	.200 <T	*	.100 <T	*	.100 <T
DEC	.050 <T	*	.100 <T	*	*	*	.050 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1			RAW 2		TREATED	SITE 1		SITE 2	
						STANDING	FREE FLOW	STANDING	FREE FLOW
M-XYLENE (UG/L)					DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)			
JAN	*		BOL		.100 <T	*	BOL	*	
FEB	*		BOL		BOL	*	BOL	*	
MAR	*		BOL		BOL	*	BOL	*	
APR	*		BOL		BOL	*	.300 <T	*	
MAY	*		11V		.100 <T	*	BOL	*	
JUN	*		BOL		BOL	*	11A	*	
JUL	*		BOL		BOL	*	BOL	*	
AUG	*		*		BOL	*	.100 <T	*	
SEP	BOL		*		BOL	*	.200 <T	*	
OCT	BOL		*		BOL	*	BOL	*	
NOV	BOL		*		BOL	*	BOL	*	
DEC	BOL		*		BOL	*	BOL	*	BOL
O-XYLENE (UG/L)					DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)			
JAN	*		BOL		BOL	*	.050 <T	*	
FEB	*		BOL		BOL	*	BOL	*	
MAR	*		BOL		BOL	*	BOL	*	
APR	*		BOL		BOL	*	BOL	*	
MAY	*		11V		.050 <T	*	BOL	*	
JUN	*		BOL		BOL	*	11A	*	
JUL	BOL		*		.050 <T	*	.050 <T	*	
AUG	BOL		*		.100 <T	*	.150 <T	*	
SEP	BOL		*		.050 <T	*	.150 <T	*	
OCT	BOL		*		.050 <T	*	BOL	*	
NOV	BOL		*		BOL	*	.050 <T	*	
DEC	BOL		*		BOL	*	BOL	*	BOL
STYRENE (UG/L)					DET'N LIMIT = 0.05	GUIDELINE = 100 (01)			
JAN	*		BOL		BOL	*	BOL	*	
FEB	*		BOL		BOL	*	BOL	*	
MAR	*		BOL		BOL	*	.150 <T	*	
APR	*		BOL		.150 <T	*	.150 <T	*	
MAY	*		11V		.100 <T	*	.150 <T	*	
JUN	*		BOL		BOL	*	11A	*	
JUL	BOL		*		.100 <T	*	.200 <T	*	
AUG	.100 <T		*		BOL	*	.150 <T	*	
SEP	BOL		*		BOL	*	.050 <T	*	
OCT	.100 <T		*		BOL	*	BOL	*	
NOV	.100 <T		*		BOL	*	.100 <T	*	
DEC	.100 <T		*		BOL	*	.050 <T	*	.050 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT

RAW 1			RAW 2		TREATED		STANDING		SITE 1		SITE 2	
CHLOROFORM (UG/L)												
					DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)					
JAN	.		BDL		15.000		.		16.600		.	
FEB	.		BDL		6.400		.		16.400		.	
MAR	.		BDL		15.400		.		18.500		.	
APR	.		BDL		13.100		.		18.700		.	
MAY	.		11V		16.900		.		17.000		.	
JUN	.		BDL		21.300		.		11A		.	
JUL	.300 <T		.		17.900		.		23.800		.	
AUG	.300 <T		.		25.000		.		36.700		.	
SEP	BDL		.		29.200		.		38.800		.	
OCT	.300 <T		.		31.500		.		32.000		.	
NOV	BDL		.		22.900		.		35.000		.	
DEC	BDL		.		15.900		.		.		24.600	
111, TRICHLOROETHANE (UG/L)												
					DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)					
JAN	.		BDL		BDL		.		BDL		.	
FEB	.		BDL		BDL		.		BDL		.	
MAR	.		BDL		BDL		.		BDL		.	
APR	.		BDL		BDL		.		BDL		.	
MAY	.		11V		BDL		.		BDL		.	
JUN	.		BDL		BDL		.		11A		.	
JUL	BDL		.		BDL		.		BDL		.	
AUG	BDL		.		BDL		.		BDL		.	
SEP	BDL		.		BDL		.		BDL		.	
OCT	BDL		.		BDL		.		BDL		.	
NOV	BDL		.		BDL		.		BDL		.	
DEC	BDL		.		.060 <T		.		.		BDL	
DICHLOBROMOMETHANE (UG/L)												
					DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)					
JAN	.		BDL		10.600		.		10.850		.	
FEB	.		BDL		6.150		.		10.400		.	
MAR	.		BDL		9.450		.		9.500		.	
APR	.		BDL		10.000		.		10.300		.	
MAY	.		11V		7.900		.		9.800		.	
JUN	.		BDL		10.700		.		11A		.	
JUL	.200 <T		.		10.300		.		12.000		.	
AUG	.150 <T		.		11.700		.		14.900		.	
SEP	BDL		.		11.400		.		14.350		.	
OCT	.200 <T		.		11.100		.		13.800		.	
NOV	BDL		.		11.000		.		13.600		.	
DEC	BDL		.		9.000		.		.		11.700	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1		RAW 2	TREATED	STANDING	SITE 1	FREE FLOW	STANDING	SITE 2
CHLORO Dibromomethane (UG/L)			DET*N LIMIT = 0.10	GUIDELINE = 350 (A1+)				
JAN	*	BDL	4,500	*		BDL	*	*
FEB	*	BDL	4,100	*		6,000	*	*
MAR	*	BDL	4,900	*		5,300	*	*
APR	*	BDL	6,200	*		6,200	*	*
MAY	*	!IV	5,000	*		5,900	*	*
JUN	*	BDL	5,000	*		1LA	*	*
JUL	*100 <T	*	5,200	*		5,800	*	*
AUG	BDL	*	5,900	*		7,100	*	*
SEP	BDL	*	5,100	*		7,200	*	*
OCT	BDL	*	4,200	*		5,900	*	*
NOV	BDL	*	4,900	*		5,600	*	*
DEC	BDL	*	3,900	*				5,000
T-CHLOROETHYLENE (UG/L)			DET*N LIMIT = 0.05	GUIDELINE = 5 (01)				
JAN	*	BDL	BDL	*		BDL	*	*
FEB	*	BDL	BDL	*		BDL	*	*
MAR	*	BDL	BDL	*		BDL	*	*
APR	*	BDL	BDL	*		BDL	*	*
MAY	*	!IV	BDL	*		BDL	*	*
JUN	*	BDL	BDL	*		1LA	*	*
JUL	BDL	*	BDL	*		BDL	*	*
AUG	BDL	*	BDL	*		BDL	*	*
SEP	BDL	*	.050 <T	*		BDL	*	*
OCT	BDL	*	BDL	*		BDL	*	*
NOV	BDL	*	BDL	*		BDL	*	*
DEC	BDL	*	BDL	*		BDL	*	BDL
BROMOFORM (UG/L)			DET*N LIMIT = 0.20	GUIDELINE = 350 (A1+)				
JAN	*	BDL	1,000 <T	*		1,000 <T	*	*
FEB	*	BDL	.800 <T	*		.800 <T	*	*
MAR	*	BDL	.600 <T	*		.600 <T	*	*
APR	*	BDL	.800 <T	*		.600 <T	*	*
MAY	*	!IV	.600 <T	*		.800 <T	*	*
JUN	*	BDL	.400 <T	*		1LA	*	*
JUL	BDL	*	.800 <T	*		.600 <T	*	*
AUG	BDL	*	1,000 <T	*		1,000 <T	*	*
SEP	BDL	*	.800 <T	*		1,200 <T	*	*
OCT	BDL	*	.600 <T	*		.800 <T	*	*
NOV	BDL	*	.400 <T	*		.600 <T	*	*
DEC	BDL	*	.600 <T	*				.600 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1990
WATER TREATMENT PLANT DISTRIBUTION SYSTEM

RAW 1	RAW 2	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
ETHYLENE DIBROMIDE (UG/L)			GUIDELINE = 50 (01)			
JAN	BOL	BOL		BOL		BOL
FEB	BOL	BOL		BOL		BOL
MAR	BOL	BOL		BOL		BOL
APR	BOL	BOL		BOL		BOL
MAY	BOL	BOL		BOL		BOL
JUN	BOL	BOL		BOL		BOL
JUL	BOL	BOL		BOL		BOL
AUG	BOL	BOL		BOL		BOL
SEP	BOL	BOL		BOL		BOL
OCT	BOL	BOL		BOL		BOL
NOV	BOL	BOL		BOL		BOL
DEC	BOL	BOL		BOL		BOL
TOTAL TRIMALOMETHANES (UG/L)			GUIDELINE = 350 (A1)		BOL	
			DET'N LIMIT = 0.50			
JAN	BOL	31.000		34.400		
FEB	BOL	17.450		33.700		
MAR	BOL	30.400		33.950		
APR	BOL	30.100		33.800		
MAY	BOL	30.400		33.500		
JUN	BOL	37.400		ILA		
JUL	BOL	34.200		42.200		
AUG	BOL	43.500		59.750		
SEP	BOL	46.400		61.450		
OCT	BOL	47.400		52.550		
NOV	BOL	39.150		54.750		
DEC	BOL	29.350				41.900

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER -----	UNIT ----	DETECTION LIMIT -----	GUIDELINE -----
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
-----	----	-----	-----
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZIME	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
-----	----	-----	-----
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: $\mu\text{g/L}$

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	$\mu\text{g/L}$	AL
CDWG C	87/01			5.000	$\mu\text{g/L}$	MAC
EPA C	87/07			5.000	$\mu\text{g/L}$	MCL
EPAA C	80/11			6.600	$\mu\text{g/L}$	AMBIENT **
FERC C	84/05			1.000	$\mu\text{g/L}$	MCL
WHO C	84/01			10.000	$\mu\text{g/L}$	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6 DETECTION LIMIT: (FOR METHOD POCODO) $0.05 \mu\text{g/L}$ SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: $1780-1800 \text{ mg/L}$ AT 25°C (41).
THRESHOLD ODOUR: $0.5 - 10 \text{ PPM}$ IN WATER THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45);
MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA
NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI), (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

